21. (Amended) A device for detecting optical signals, comprising

Fig. 1 Fig. 3 Fig. 2 Fig. 4

means (10,11, 20, 80) structured and arranged for generating at least one reference light ray which has at least one of

(i) frequency shift ~~and~~ or frequency modulation or both;

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(ii phase shift ~~and~~ or phase modulation or both; and

(iii) time displacement, over the optical signal to be detected;

means (20, 30) structured and arranged for aligning at least one of the ~~optical signal to be detected~~ signals and reference light ray(s) such that they can be brought into interference; and

at least one detector (40) with a demodulator (50) being structured and arranged to detect amplitude modulation of a resulting signal from said interference; at least one

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wherein at least one wavelength-dependent element (11, 12, 14) is structured and arranged to change angle(s) of at least one of the optical signals and reference rays being brought into interference depending upon wavelength; and

at least one of the detectors (40) is structured and arranged ~~alone or in combination with at least one of a demodulator (50) and optical elements,~~ to measure at least one of time and spatial modulation of intensity ~~with reference to an entire or parts~~ of at least part of ~~the detected ray~~ cross-section of the resulting detected signal. What is being sensed

22. (Amended) A device for generating optical signals by modulation of optical carriers, comprising

49 photodetectors

means structured and arranged for generating at least one reference light ray which has at least one of

(i) frequency shift ~~and~~ or frequency modulation or both;

(ii phase shift ~~and~~ or phase modulation or both; and

(iii) time displacement, over the optical signal to be detected;

means structured and arranged for aligning the optical signal carrier and at least one of the ~~optical signal to be detected and~~ reference light ray(s) such that they can be brought into interference; and

at least one coupler structured and arranged to couple out ~~the~~ a resulting ~~interference~~ signal from said interference;

wherein, at least one wave-dependent element is structured and arranged to change angle(s) of at least one of the optical carrier and reference light rays being brought into interference, depending upon wavelength; and

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at least one of the couplers is structured and arranged ~~either alone or in combination with at least one of a demodulator and optical elements,~~ to make the thus coupled-out signal dependent upon at least one of time ~~and~~ (amplitude modulation) or spatial modulation of intensity with reference to ~~an entire or parts~~ at least part of ~~the detected ray~~ cross-section of the resulting interference signal.

23. (Amended) A device in accordance with claim 22, wherein said generating means (10, 11, 20, 80) include a beam splitter and at least one of a frequency shifter ~~and~~ or modulator, a phase shifter ~~and~~ or modulator (20), and a travel distance (90).

24. (Unchanged)A device in accordance with claim 21, wherein said generating means (10, 11, 20, 80) include a local light source.

25.(Unchanged) A device in accordance with claim 21, wherein at least one of said wavelength-dependent elements (11, 12, 14) includes a diffracting optical element.

26. (Amended) A device in accordance with claim 25, wherein said diffracting optical element is at least one of an optical grating (11, 14), a hologram, ~~and~~ or a system of thin films.

27. (Unchanged)A device in accordance with claim 21, wherein at least one of the wavelength-dependent elements (11, 12, 14) includes a dispersing optical element.

28. (Unchanged) A device in accordance with claim 27, wherein said dispersing optical element is a prism (12).

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29. (Unchanged) A device in accordance with claim 21, wherein at least one of the wavelength-dependent elements (11, 12, 14) is structured and arranged as a beam splitter (11) or combiner.

30. (Amended) A device in accordance with claim 21, wherein at least one of the wavelength-dependent elements (11, 12, 14) is structured and arranged to ~~change type or degree of dependence of angle deflection by the~~ have a modifiable wavelength dependency of the deflection angle.

31. (Amended) A device in accordance with claim 21, wherein at least one of the wavelength-dependent elements is ~~structured and arranged~~ simultaneously ~~as~~ at least one of ?

(a) a frequency shifter, or frequency ~~and~~ modulator, ~~; and~~

(b) a phase shifter ~~and~~ or phase modulator.

32. (Unchanged) A device in accordance with claim 31, wherein one or more of the wavelength-dependent elements is structured and arranged as an acousto-optical modulator.

33. (Unchanged) A device in accordance with claim 21, additionally comprising

means for deflecting at least one of the reference light ray and optical signal.

34.(Amended) A device for detecting optical signals, comprising

means (10, 11, 20, 80) structured and arranged for generating at least one reference light ray which has at least one of

(i) frequency shift ~~and~~ or frequency modulation or both;

(ii) phase shift ~~and~~ or phase modulation or both; and

(iii) time displacement, over the optical signal to be detected;

C1 con't

means (20, 30) structured and arranged for aligning at least one of the optical ~~signal to be detected~~ signals and reference light ray(s) such that they can be brought into interference; and

at least one detector (40) with a demodulator (50) structured and arranged to detect amplitude modulation of a resulting signal from said interference;

wherein at least one wavelength-dependent element (11, 12, 14) is structured and arranged to change angle(s) of at least one of the optical signals and reference rays being brought into interference depending upon wavelength;

at least one of the detectors (40) is structured and arranged ~~alone or in combination with at least one of a demodulator (50) an optical elements,~~ to measure at least one of time and spatial modulation of intensity with reference to ~~an entire or parts~~ at least part of ~~the detected ray~~ cross-section of the resulting detected signal; and

at least one of the wavelength-dependent elements (11, 12, 14) is structured and arranged to be at least one of rotatable or tiltable ~~and swivellable~~.

35. (Amended )A device for detecting optical signals, comprising

means (10, 11, 20, 80) structured and arranged for generating at least one reference light ray which has at least one of

(i) frequency shift ~~and~~ or frequency modulation or both;

(ii) phase shift ~~and~~ or phase modulation or both; and

(iii) time displacement, over the optical signal to be detected;

means (20, 30) structured and arranged for aligning at least one of the optical ~~signal to be detected~~ signals and reference light ray(s) such that they can be brought into interference;

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at least one detector (40) with a demodulator (50) structured and arranged to detect amplitude modulation of a resulting signal from said interference;

wherein at least one wave-length dependent element (11,12, 14) is structured and arranged to change angle(s) of at least one of the optical signals and reference rays being brought into interference depending upon the wavelength;

at least one of the detectors (40) is structured and arranged~~, alone or in combination with at least one of a demodulator (50) and optical elements,~~ to measure at least one of time and spatial modulation of intensity with reference to ~~an entire or parts~~ at least a part of ~~the detected ray~~ cross-section of the resulting detected signal; and

additionally comprising at least one of a multiplex hologram and other optical elements structured and arranged for simultaneously handling multiple rays.

36. (Amended) A device for detecting optical signals, comprising

means (10, 11, 20, 80) structured and arranged for generating at least one reference light ray which has at least one of

(i) frequency shift ~~and~~ or frequency modulation or both;

(ii) phase shift ~~and~~ or phase modulation or both; and

(iii) time displacement, over the optical signal to be detected;

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means (20, 30) structured and arranged for aligning at least one of the optical ~~signal to be detected~~ signals and reference light ray(s) such that they can be brought into interference;

at least one detector (40) with a demodulator (50) structured and arranged to detect amplitude modulation of a resulting signal from said interference;

wherein at least one wavelength dependent element (11, 12, 14) is structured and arranged to change angle(s) of at least one of the optical signals and reference rays being brought into interference depending upon wavelength,

at least one of the detectors (40) is structured and arranged~~, alone or in combination with at least one of a demodulator (50) and optical elements,~~ to measure at least one of time and spatial modulation of intensity with reference to ~~an entire or parts~~ at least part of ~~the detected ray~~ cross-section of a resulting signal from said interference; and

said device being structured and arranged for handling multiple rays.

37. (Unchanged )The device in accordance with claim 36, additionally comprising

parts of said device being provided in multiple for handling the multiple rays.

38. (Amended) A device for detecting optical signals, comprising

means (10, 11, 20, 80) structured and arranged for generating at least one reference light ray which has at least one of

(i) frequency shift ~~and~~ or frequency modulation or both;

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(ii) phase shift ~~and~~ or phase modulation or both; and

(iii) time displacement, over the optical signal to be detected;

means (20, 30) structured and arranged for aligning at least one of the optical ~~signal to be detected~~ signals and reference light ray(s) such that they can be brought into interference~~; and~~

at least one detector (40) with a demodulator (50) structured and arranged to detect amplitude modulation of a resulting signal from said interference;

wherein at least one wavelength-dependent element (11, 12, 14) is structured and arranged to change angle(s) of at least one of the optical signals and reference rays being brought into interference depending upon wavelength;

at least one of the detectors (40) is structured and arranged~~, alone or in combination with at least one of a demodulator (50) and optical elements,~~ to measure at least one of time and spatial modulation of intensity with reference to ~~an entire or~~ at least part of ~~the detector ray~~ cross-section of the resulting detected signal; and

additionally comprising means structured and arranged for changing the

ray cross-section of at least one of the rays involved.

39. (Amended) A device in accordance with claim 21, additionally comprising

means structured and arranged for providing at least one of spectral filtration~~,~~ and spatial modulation of

at least one of phase and amplitude of at least one of said rays involved.

40. (Amended) A device for detecting optical signals, comprising

C' con't

means (10, 11, 20, 80) structured and arranged for generating at least one reference light ray which has at least one of

(i) frequency shift ~~and~~ or frequency modulation or both;

(ii) phase shift ~~and~~ or phase modulation or both; and

(iii) time displacement, over the optical signal to be detected;

means (20, 30) structured and arranged for aligning at least one of the optical ~~signal to be detected~~ signals and reference light ray(s) such that they can be brought into ~~interference;~~ and

at least one detector (40) with a demodulator (50) structured and arranged to detect amplitude modulation of a resulting signal from said interference;

wherein at least one wavelength-dependent element (11, 12, 14) is structured and arranged to change angle(s) of at least one of the optical signals and reference rays being brought into interference depending upon wavelength;

at least one of the detectors (40) is structured and arranged~~, alone or in combination with at least one of the demodulator (50) and optical elements,~~ to measure at least one of time and spatial modulation of intensity with reference to

~~an entire or~~ at least part of ~~the detector ray~~ cross-section of the resulting detected signal; and

additionally comprising at least one of (a) and (b):

(a) wave guides structured and arranged such that ~~all or~~ at least part of the rays involved are guided ~~wholly or~~ at least partially therethrough; and

(b) ~~all or~~ at least part of the optical elements being formed by integrated optics.

C1 con't

41. (Unchanged) A device in accordance with claim 21, which is an optical receiver or optical modulator, or spectrometer.

42. (Unchanged) A device in accordance with claim 21, omitting a local oscillator.

43. (Unchanged) A device in accordance with claim 22, omitting a local oscillator.

44. (Unchanged) The device in accordance with claim 21, structured and arranged for using a ray path of a Michelson interferometer, and comprising

a beam splitter (10),

a prism (12) structured and arranged as the wavelength dependent element,

a mirror (20) and means for shifting the same to constitute a phase modulator,

another mirror (30) pivotally provided to adjust the wavelength to be detected,

a detector (40) structured and arranged to have an areal design and integrate intensity over the entire cross-section of the ray to be detected,

a lock- in amplifier as the demodulator (50), and

a modulator control (60) structured and arranged for controlling the first mirror (20) as the phase modulator.

45. (Unchanged) The device in accordance with claim 22, structured and arranged for using a ray path of a Michelson interferometer, and comprising

a beam splitter (10),

a prism (12) structured and arranged as the wavelength dependent element,

C1 cont'd

a mirror (20) and means for shifting the same to constitute a phase modulator,

another mirror (30) pivotally provided to adjust the wavelength to be detected,

a detector (40) structured and arranged to have an areal design and integrate intensity over the entire cross-section of the ray to be detected,

a lock-in amplifier as the demodulator (50), and

a modulator control (60) structured and arranged for controlling the first mirror (20) as the phase modulator.

46. (Unchanged) The device in accordance with claim 21, structured and arranged for using the ray path of a Mach-Zehnder interferometer, and comprising

a first beam splitter (11) structured and arranged as a diffracting optical element and forming the wavelength-dependent element,

a first mirror (20) and means for shifting the same to form a phase modulator,

a second mirror (30) being pivotally mounted for adjusting the wavelength to be detected,

a second beam splitter (13) being structured and arranged as a combiner for bringing partial rays into interference,

two detectors (40, 40') structured and arranged for detecting the interference rays, to have an areal design and integrate the intensity over the whole cross-section of the detectors in each case,

a lock-in amplifier with differential input constituting the demodulator (50) and

C1 con't

a modular control (60) structured and arranged as said shifting means to control the first mirror (20) as the phase modulator.

47. (Unchanged ) The device in accordance with claim 22, structured and arranged for using the ray path of a Mach-Zehnder interferometer, and comprising

a first beam splitter (11) structured and arranged as a diffracting optical element and forming the wavelength-dependent element,

a first mirror (20) and means for shifting the same to form a phase modulator,

a second mirror (30) being pivotally mounted for adjusting the wavelength to be detected,

a second beam splitter (13) being structured and arranged as a combiner for bringing partial rays into interference,

two detectors (40, 40') structured and arranged for detecting the interference rays, to have an areal design and integrate the intensity over the

whole cross-section of the detectors in each case,

a lock-in amplifier with differential input constituting the demodulator (50) and

a modular control (60) structured and arranged as said shifting means to control the first mirror (20) as the phase modulator.

48. (Unchanged) A device in accordance with claim 21, structured and arranged for detecting one of partial rays delayed in time, such that there is a time shift between the reference and signal rays, comprising

means for providing the change in relative position between partial rays by providing time displacement of one of the partial rays,

C1 cont

a glass fiber (70) structured and arranged for guiding of an incident signal therethrough,

a first beam splitter (80) structured and arranged with glass fiber technology and through which the incident signal is guided subsequent to said glass fiber (70),

means for expanding one part of said signal,9

a second beam splitter (13) through which said expanded signal is guided after a short period,

a mirror (30) pivotally mounted for adjusting wavelength to be detected and guiding said expanded signal to said second beam splitter (13),

a travel distance (90) arranged for delaying the other part of the signal having passed through said first beam splitter (80),

means for expanding said other delayed ray and guiding the same to said second beam splitter (13),

a wavelength-dependent element (14) structured and arranged as a diffracting optical element for guiding said delayed and expanded ray to said second beam splitter (13) along said travel distance (90),

said second beam splitter (13), structured and arranged as a combiner for bringing said partial rays into interference with one another,

detectors (40, 40') structured and arranged for detecting said combined rays, to have an areal design and integrate the intensity over the entire cross-section of the ray to be detected in each case, and

said demodulator (50) being electronic and having a varying design depending upon modulation type of the signal.

C1 cont'd

49. (Unchanged) A device in accordance with claim 22, structured and arranged for detecting one of partial rays delayed in time, such that there is a time shift between the reference and signal rays, comprising

means for providing the change in relative position between partial rays by providing time displacement of one of the partial rays,

a glass fiber (70) structured and arranged for guiding of an incident signal therethrough,

a first beam splitter (80) structured and arranged with glass fiber technology and through which the incident signal is guided subsequent to said glass fiber (70),

means for expanding one part of said signal,

a second beam splitter (13) through which said expanded signal is guided after a short period,

a mirror (30) pivotally mounted for adjusting wavelength to be detected and guiding said expanded signal to said second beam splitter (13),

a travel distance (90) arranged for delaying the other part of the signal having passed through said first beam splitter (80),

means for expanding said other delayed ray and guiding the same to said second beam splitter (13),

a wavelength-dependent element (14) structured and arranged as a diffracting optical element for guiding said delayed and expanded ray to second beam splitter (13) along said travel distance (90),

said second beam splitter (13), structured and arranged as a combiner for bringing said partial rays into interference with one another,

detectors (40, 40') structured and arranged for detecting said combined rays, to ~~have an areal design~~ and integrate the intensity over the entire cross-section of the ray to be detected in each case, and

C1 cont

said demodulator (50) being electronic and having a varying design depending upon modulation type of the signal.

50. (new) A device for detecting or generating optical signals, comprising

a source of a reference light ray,

a beam splitter (10) positioned downstream of said source to receive the reference light ray and split the same into two partial rays,

a prism (12) arranged on a side of the beam splitter (10) and as a wavelength-dependent element,

a first mirror (20) arranged on a side of said beam splitter (10) opposite said incoming reference ray and comprising means for shifting the same (20) to serve as a phase modulator in reflecting a beam back the beam splitter (10),

a second mirror (30) pivotally arranged on a side of said prism (12) opposite said beam splitter (10) to reflect back and adjust wavelength of a signal

to be detected,

a detector (40) arranged on a side of said beam splitter (10) opposite said prism (12), said detector having an areal design and integrating intensity over a whole cross-section of the ray to be detected,

a lock-in amplifier arranged as a demodulator (50) and coupled to said detector (40), and

a modulator control (60) coupled to both said demodulator (50) and first mirror (20) to act as said shifting means to control the first mirror (20) as the phase modulator.

C1 con't

51. (new) A device for detecting or generating optical signals, comprising

a source of a reference light ray,

a first beam splitter (11) arranged downstream of said source to split the light ray into two partial rays, said first beam splitter (11) arranged as a diffracting element and wavelength dependent element,

a first mirror (20) arranged downstream of said first beam splitter (10) on a side thereof opposite said incoming ray and comprising means for shifting the same to reflect and phase modulate a first one of said partial rays,

a second mirror (30) pivotally positioned downstream of said beam splitter (11) to reflect a second one of said partial rays and adjust wavelength of the ray to be detected,

a second beam splitter (13) arranged downstream of said first (20) and second (30) mirrors to combine the partial rays in interference,

two separate detectors (40,40') arranged downstream of said second beam splitter (13) on a side thereof opposite said incoming partial rays, each

said detector (40, 40') having an areal design and integrating intensity over an entire cross-section of a respective ray being detected,

a lock-in amplifier arranged as a demodulator (50) and coupled to each said detector (40, 40'), and

a modulator control (60) coupled to both said demodulator (50) and first mirror (20) to act as said shifting means to control the first mirror (20) as the phase modulator.

52. (new) A device for detecting or generating an optical signal, comprising

C1 con't

a source of a reference light ray,

a glass fiber (70) arranged to receive and guide an incident signal of the ray therethrough,

a first beam splitter (80) being positioned downstream of said fiber (70) from said incident signal and comprising glass fiber technology to split the incident signal into two partial signals,

first means for expanding a first one of said partial signals and positioned downstream of said first beam splitter (80),

a mirror (30) positioned downstream of said first expanding means and pivotally arranged to adjust wavelength of said first partial signal to be detected,

a travel distance (90) arranged downstream of said first beam splitter (80) for receiving and delaying a second one of said partial signals,

second means for expanding the second one of said partial signals after passing along said travel distance (90),

a wave length dependent element (14) positioned downstream of said second expanding means,

a second beam splitter (13) arranged downstream of said mirror (30) and wavelength dependent element (14), to combine said partial signals in interference,

two separate detectors (40, 40') arranged downstream of said second beam splitter (13) on a side thereof opposite said incoming partial signals, each said detector (40,40') having an areal design and integrating intensity over an entire cross-section of a respective signal being detected, and

a demodulator (50) coupled to both said separate detectors (40,40').